General

Guideline Title

Guideline for care of patients undergoing pneumatic tourniquet-assisted procedures.

Bibliographic Source(s)

Denholm B, Conner R. Guideline for care of patients undergoing pneumatic tourniquet-assisted procedures. In: 2015 guidelines for perioperative practice. Denver (CO): Association of periOperative Registered Nurses (AORN); 2013 Apr. p. 153-78. [203 references]

Guideline Status

This is the current release of the guideline.

Regulatory Alert

FDA Warning/Regulatory Alert

Note from the National Guideline Clearinghouse: This guideline references a drug(s) for which important revised regulatory and/or warning information has been released.

- December 14, 2016 – General anesthetic and sedation drugs : The U.S. Food and Drug Administration (FDA) is warning that repeated or lengthy use of general anesthetic and sedation drugs during surgeries or procedures in children younger than 3 years or in pregnant women during their third trimester may affect the development of children's brains. Consistent with animal studies, recent human studies suggest that a single, relatively short exposure to general anesthetic and sedation drugs in infants or toddlers is unlikely to have negative effects on behavior or learning. However, further research is needed to fully characterize how early life anesthetic exposure affects children's brain development.

Recommendations

Major Recommendations

Note from the Association of periOperative Nurses (AORN): These recommended practices are intended to provide guidance to perioperative team members on the use of pneumatic tourniquets. These recommended practices provide information about testing, applying, and cleaning pneumatic tourniquet equipment, and the patient care associated with the safe use of this equipment. Pneumatic tourniquet equipment consists of a pressure regulator with display, connective tubing, and an inflatable cuff. These recommended practices provide general guidelines for developing policies and procedures for safe use of a pneumatic tourniquet in the practice setting. Due to the variety and complexity of pneumatic tourniquet

equipment, policies and procedures that reflect considerations for specific pneumatic tourniquet systems are beyond the scope of these recommendations. Finger tourniquets and tourniquets used for phlebotomy or traumatic bleeding are outside the scope of this document.

I. The perioperative registered nurse (RN) should assess the patient preoperatively for risks and potential contraindications related to the use of a pneumatic tourniquet.
II. The perioperative RN should collaborate with the surgeon and anesthesia professional to develop and confirm the plan of care related to the use of a tourniquet.
III. Patient safety should be the primary consideration when using a pneumatic tourniquet and its accessories.
IV. Inflation of the tourniquet cuff should be done under the direction of the surgeon and coordinated with the anesthesia professional.
V. Tourniquet inflation time and patient condition should be monitored while the tourniquet cuff is inflated.
VI. The perioperative RN should collaborate with the surgeon and anesthesia professional to implement safe practices when deflating the pneumatic tourniquet.
VII. The perioperative RN should evaluate the outcome of patient care after the tourniquet has been deflated.
VIII. The pneumatic tourniquet and accessories should be cleaned after each use according to the manufacturer's written instructions.
IX. Perioperative team members should receive initial and ongoing education and competency verification on the use of the pneumatic tourniquet and on their understanding of the physiologic responses that influence the care of a patient undergoing pneumatic tourniquet-assisted operative or invasive procedures.
X. Documentation should reflect activities related to the care of the patient undergoing pneumatic tourniquet-assisted operative or other invasive procedures.
XI. Policies and procedures for use of pneumatic tourniquets should be developed, reviewed periodically, revised as necessary, and readily available in the practice setting.
XII. Perioperative personnel should participate in quality assurance and performance improvement activities that are consistent with the health care organization's plan to improve understanding of the physiologic responses that influence the care of a patient undergoing pneumatic tourniquet-assisted operative or other invasive procedures and compliance with safe practices when using pneumatic tourniquets.

Clinical Algorithm(s)

None provided

Scope

Disease/Condition(s)

Any condition requiring the use of surgical and other invasive tourniquet-assisted procedures

Guideline Category

Management

Treatment

Clinical Specialty

Anesthesiology

Nursing

Surgery

Intended Users

Advanced Practice Nurses

Nurses

Guideline Objective(s)

To provide guidance to perioperative team members on the use of pneumatic tourniquets including testing, applying, and cleaning pneumatic tourniquet equipment, and the patient care associated with the safe use of this equipment

Target Population

Patients undergoing surgical and other invasive procedures requiring the use of a pneumatic tourniquet to occlude blood flow, obtain a near bloodless field for extremity surgery, or to confine a bolus of anesthetic in an extremity for intravenous regional anesthesia

Interventions and Practices Considered

1. Preoperative assessment of the patient
2. Collaboration with the surgeon and anesthesia professional to develop and confirm the plan of care
3. Consideration of patient safety
4. Tourniquet cuff inflation under direction of the surgeon and coordinated with the anesthesia professional
5. Monitoring of tourniquet inflation time and patient condition
6. Implementation of safe deflation practices
7. Evaluation of the outcome of patient care following tourniquet deflation
8. Cleaning of the pneumatic tourniquet and accessories
9. Initial and ongoing education and competency verification of preoperative team members
10. Documentation of activities related to the care of the patient
11. Development of policies and procedures for use of pneumatic tourniquets
12. Participation of perioperative personnel in quality assurance and performance improvement activities

Major Outcomes Considered

- Patient safety
- Quality assessment
- Performance activities

Methodology

Methods Used to Collect/Select the Evidence

Searches of Electronic Databases

Description of Methods Used to Collect/Select the Evidence

Evidence Review

A medical librarian conducted searches of the databases MEDLINE®, CINAHL®, Scopus®, and the Cochrane Database of Systematic Reviews for meta-analyses, systematic reviews, randomized controlled and non-randomized trials, guidelines, and case reports.

Search terms included: pneumatic tourniquet, tourniquet safety, tourniquet, surgical hemostasis, surgical procedures, nursing care, perioperative care, patient positioning, compartment syndromes, arm injuries, leg injuries, hand injuries, pain measurement, peripheral nervous system, peripheral nervous system diseases, nerve palsy, metabolic phenomena, metabolic changes, metabolic effects, vital signs, respiration, carbon dioxide,

intracranial pressure, oxygen consumption, cardiac output, acidosis, hyperemia, venous congestion, blood pressure, lactic acid, hemodynamics, pulse, hypothermia, hyperthermia, systemic inflammatory response, Esmarch bandage, Urias bag, Pomidor roll-cuff, bandage, elastic wrap, intravenous regional anesthesia, Bier block, ankle block, conduction anesthesia, bloodless field, occlusion pressure, ischemia, and reperfusion injury.

The search was limited to articles published in English between January 2006 and February 2012. The search was expanded to include articles published before 2006 when the original search did not identify more recent literature on a particular topic. The librarian established continuing alerts on the pneumatic tourniquet topics. The lead author and librarian identified relevant guidelines from government agencies and standards-setting bodies.

Number of Source Documents

234 articles met the inclusion criteria and were included in the review.

Methods Used to Assess the Quality and Strength of the Evidence

Weighting According to a Rating Scheme (Scheme Given)

Rating Scheme for the Strength of the Evidence

I: Randomized controlled trial (RCT) or experimental study, systematic review of all RCTs

II: Quasi-experimental study, systematic review of quasi-experimental studies or combination of quasi-experimental and RCTs

III: Non-experimental studies, qualitative studies, systematic review of non-experimental studies, combination of non-experimental, quasi-experimental, and RCTs, or any or all studies are qualitative

IV: Clinical practice guidelines, position or consensus statements

V: Literature review, expert opinion, case Report, community standard, clinician experience, consumer experience, organizational experience (quality improvement, financial)

Methods Used to Analyze the Evidence

Systematic Review

Description of the Methods Used to Analyze the Evidence

Articles identified in the search were provided to the lead author and a doctorally prepared evidence appraiser for evaluation. Each article was reviewed and critically appraised using the Johns Hopkins Evidence-Based Practice Model and the Research or Non-Research Evidence Appraisal Tools as appropriate. The literature was independently evaluated and appraised according to the strength and quality of the evidence. Each article was then assigned an appraisal score as agreed upon by consensus of the lead author and evidence appraiser.

Methods Used to Formulate the Recommendations

Expert Consensus

Description of Methods Used to Formulate the Recommendations

The collective evidence supporting each intervention within a specific recommendation was summarized and used to rate the strength of the evidence using the Association of periOperative Registered Nurses (AORN) Evidence Rating Model. Factors considered in review of the collective evidence were the quality of research, quantity of similar studies on a given topic, and consistency of results supporting a

recommendation.

Rating Scheme for the Strength of the Recommendations

1: Strong Evidence: Interventions or activities for which effectiveness has been demonstrated by strong evidence from rigorously-designed studies, meta-analyses, or systematic reviews, rigorously-developed clinical practice guidelines, or regulatory requirements.

- Evidence from a meta-analysis or systematic review of research studies that incorporated evidence appraisal and synthesis of the evidence in the analysis.
- Supportive evidence from a single well-conducted randomized controlled trial.
- Guidelines that are developed by a panel of experts, that derive from an explicit literature search methodology, and include evidence appraisal and synthesis of the evidence.

1: Regulatory Requirement: Federal law or regulation.

2: Moderate Evidence: Interventions or activities for which the evidence is less well established than for those listed under "Strong Evidence."

- Supportive evidence from a well-conducted research study.
- Guidelines developed by a panel of experts which are primarily based on the evidence but not supported by evidence appraisal and synthesis of the evidence.
- Non-research evidence with consistent results and fairly definitive conclusions.

3: Limited Evidence: Interventions or activities for which there is currently insufficient evidence or evidence of inadequate quality.

- Supportive evidence from a poorly conducted research study.
- Evidence from non-experimental studies with high potential for bias.
- Guidelines developed largely by consensus or expert opinion.
- Non-research evidence with insufficient evidence or inconsistent results.
- Conflicting evidence, but where the preponderance of the evidence supports the recommendation.

4: Benefits Balanced With Harms: Selected interventions or activities for which the Association of periOperative Registered Nurses (AORN) Recommended Practices Advisory Board (RPAB) is of the opinion that the desirable effects of following this recommendation outweigh the harms.

5: No Evidence: Interventions or activities for which no supportive evidence was found during the literature search completed for the recommendation.

- Consensus opinion

Cost Analysis

A formal cost analysis was not performed and published cost analyses were not reviewed.

Method of Guideline Validation

External Peer Review

Internal Peer Review

Description of Method of Guideline Validation

The Recommended Practices for Care of Patients Undergoing Pneumatic Tourniquet-Assisted Procedures have been approved by the Association of periOperative Registered Nurses (AORN) Recommended Practices Advisory Board. They were presented as proposed recommendations for comments by members and others. They are effective June 15, 2013.

Evidence Supporting the Recommendations

Type of Evidence Supporting the Recommendations

The type of evidence supporting recommendations is not specifically stated. See the full guideline document for systematic review and discussion of evidence.

Benefits/Harms of Implementing the Guideline Recommendations

Potential Benefits

Appropriate practices for care of patients undergoing pneumatic tourniquet-assisted procedures for prevention of patient injury

Potential Harms

Not stated

Contraindications

Contraindications

- Potential contraindications for tourniquet use:
  - Venous thromboembolism
  - Impaired circulation or peripheral vascular compromise
  - Previous revascularization of the extremity
  - Extremities with dialysis access (e.g., arteriovenous grafts, fistulas)
  - Acidosis
  - Hemoglobinopathy (e.g., sickle cell anemia)
  - Extremity infection
  - Tumor distal to the tourniquet
  - Medications (e.g., antihypertensives) and supplements (e.g., creatine)
  - History of pain or weakness in muscles or bones in extremities
  - Open fracture
  - Increased intracranial pressure
- A questionnaire circulated to members of the American College of Foot and Ankle Surgeons reported that the most commonly listed contraindications to tourniquet use included vascular disease or previous bypass and deep vein thrombosis (DVT).
- Using an elastic wrap for exsanguination is contraindicated.

Qualifying Statements

Qualifying Statements

- These recommended practices represent the Association's official position on questions regarding optimal perioperative nursing practice.
- No attempt has been made to gain consensus among users, manufacturers, and consumers of any material or product.
- Compliance with the Association of periOperative Registered Nurses (AORN) recommended practices is voluntary.
- AORN's recommended practices are intended as achievable and represent what is believed to be an optimal level of patient care within surgical and invasive procedure settings.

- Although they are considered to represent the optimal level of practice, variations in practice settings and clinical situations may limit the degree to which each recommendation can be implemented.

Implementation of the Guideline

Description of Implementation Strategy

An implementation strategy was not provided.

Institute of Medicine (IOM) National Healthcare Quality Report Categories

IOM Care Need

Staying Healthy

IOM Domain

Effectiveness

Patient-centeredness

Safety

Identifying Information and Availability

Bibliographic Source(s)

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Adaptation

Not applicable: The guideline was not adapted from another source.

Date Released

2013 Apr

Guideline Developer(s)

Association of periOperative Registered Nurses - Professional Association

Source(s) of Funding

Association of periOperative Registered Nurses (AORN)

Guideline Committee

Association of periOperative Registered Nurses (AORN) Recommended Practices Advisory Board

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Financial Disclosures/Conflicts of Interest

No financial relationships relevant to the content of this guideline have been disclosed by the authors, planners, peer reviewers, or staff.

Guideline Status

This is the current release of the guideline.

Guideline Availability

Electronic copies: Available to subscribers from the Association of periOperative Nurses Web (AORN) site .

Print copies: Available for purchase from the AORN Web site .

Availability of Companion Documents

None available

Patient Resources

None available

NGC Status

This NGC summary was completed by ECRI Institute on April 17, 2014. The information was verified by the guideline developer on May 7, 2014. This summary was updated by ECRI Institute on February 15, 2017 following the U.S. Food and Drug Administration advisory on general anesthetic and sedation drugs.

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